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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOSEPH FJELSTAD and
KONSTANTINE KARAVAKIS

Appeal 2009-003367
Application 09/020,647
Technology Center 2800

Decided: August 12, 2009

Before JOSEPH F. RUGGIERO, ROBERT E. NAPPI, and
CARL W. WHITEHEAD, JR., *Administrative Patent Judges*.

RUGGIERO, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Final Rejection of claims 35-57, which are all of the pending claims. Claims 1-34 have been cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the Brief (filed July 10, 2003), the Answer (mailed September 11, 2003), and the Reply Brief (filed October 14, 2003) for the respective details. Only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellants' Invention

Appellants' invention relates to a method of making of semiconductor chip packages including a semiconductor chip and a compliant layer. More particularly, the method relates to selectively forming elongated, flexible bond ribbons over a compliant layer with the elongated bond ribbons extending along the sloping edges of the compliant layer. *See generally* Spec. 4:27-5:17.

Claim 35 is illustrative of the invention and reads as follows:

35. A method of making a compliant semiconductor chip package comprising:

providing a semiconductor chip having a contact bearing surface including a central region bounded by a peripheral region, wherein the peripheral region of said contact bearing surface has chip contacts;

providing a dielectric protective layer over the contact bearing surface of said semiconductor chip, said dielectric protective layer having apertures for said chip contacts;

providing a compliant layer over said dielectric protective layer and over the central region of the contact bearing face of said semiconductor chip, wherein said compliant layer has a substantially flat top surface, a bottom surface that is attached to said dielectric protective layer and sloping edges between the top surface and the bottom surface, wherein the sloping edges of said compliant layer have a first curved transition region near the top surface of said compliant layer and a second curved transition region near the bottom surface of said compliant layer; and

selectively electroplating elongated bond ribbons atop said dielectric protective layer and said compliant layer, wherein each said bond ribbon electrically connects one of said chip contacts to an associated conductive terminal disposed on the top surface of said compliant layer, and wherein said elongated bond ribbons extend along the sloping edges of said compliant layer and have a first curved region overlying the first curved transition region of said compliant layer and a second curved region overlying the second curved transition region of said compliant layer.

The Examiner's Rejections

The Examiner relies on the following prior art references to show unpatentability:

Chen	US 4,671,849	Jun. 9, 1987
LeGrange	US 4,962,985	Oct. 16, 1990
Kwon	US 5,070,297	Dec. 3, 1991
Palagonia	US 5,874,782	Feb. 23, 1999

(filed Aug. 24, 1995)

Claims 35-38, 40-42, 45-54, and 57 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kwon or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over the combination of Kwon and Chen.

Claim 39 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kwon, or the combination of Kwon and Chen, and further in combination with LeGrange.

Claims 43, 44, 55, and 56 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kwon, or the combination of Kwon and Chen, and further in combination with Palagonia.¹

ISSUES

(i) *Under 35 U.S.C. § 102(b), does Kwon have a disclosure which anticipates the invention set forth in claims 35-38, 40-42, 45-54, and 57?*

The pivotal issue before us in making this determination is whether Appellants have demonstrated that the Examiner erred in finding that Kwon discloses a semiconductor chip package structure including a compliant layer, which has sloping edges between the top and bottom surfaces with the sloping edges having first and second curved transition regions near the top and bottom surfaces.

(ii) *Under 35 U.S.C. § 103(a), with respect to appealed claims 35-57, would one of ordinary skill in the art at the time of the*

¹ Although the Examiner's statement of the grounds of rejection (Ans. 11) indicates that Palagonia is combined with Kwon, "as applied to claims 35-38, 40-42, 45-54 and 57," the statement does not include the alternative combination of Kwon and Chen that was used in the rejection of claims 35-38, 40-42, 45-54, and 57. As Appellants have provided no separate arguments for the patentability of claims 43, 44, 55, and 56, however, we treat the Examiner's omission as harmless error.

invention have found it obvious to combine Kwon with Chen (claims 35-38, 40-42, 45-54, and 57) with the further separate addition of LeGrange (claim 39) and Palagonia (claims 43, 44, 55, and 56) to render the claimed invention unpatentable?

The pivotal issue before us in making this determination is whether Appellants have demonstrated that the Examiner erred in determining that the combination of Kwon and Chen results in a semiconductor chip structure in which *elongated bond ribbons* are electroplated on top of a dielectric protective layer and a compliant layer.

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence:

1. Kwon discloses (Fig. 2; col. 4, l. 36–col. 5, l. 29) a semiconductor chip package 14 including chip contacts 36, dielectric layer 34, and a compliant layer 32.
2. The compliant layer 32 is illustrated by Kwon (Fig. 2) as having sloping edges between the top surface and bottom surface.
3. Kwon also discloses (col. 5, ll. 15-29) the inclusion of V-shaped metal contacts 28 disposed through compliant layer 32 and dielectric layer 34 to make contact with chip contacts 36.
4. Chen discloses (Fig. 4B; col. 1, ll. 5-21) a semiconductor integrated circuit fabrication method for controlling the profile of an opening etched in a layer of insulating material. The openings have a rounded profile to minimize the possibility of defects formed in the overlying metal layer.

PRINCIPLES OF LAW

1. ANTICIPATION

“It is axiomatic that anticipation of a claim under § 102 can be found only if the prior art reference discloses every element of the claim.” *See In re King*, 801 F.2d 1324, 1326 (Fed. Cir. 1986); *Lindemann Maschinenfabrik GMBH v. Am. Hoist & Derrick Co.*, 730 F.2d 1452, 1458 (Fed. Cir. 1984).

In rejecting claims under 35 U.S.C. § 102, “[a] single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation.” *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1375 (Fed. Cir. 2005) (citing *Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 1565 (Fed. Cir. 1992)). “Anticipation of a patent claim requires a finding that the claim at issue ‘reads on’ a prior art reference.” *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1346 (Fed. Cir. 1999) (“In other words, if granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether it also covers subject matter not in the prior art.”) (citation omitted).

2. OBVIOUSNESS

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) (stating that 35 U.S.C. § 103 leads to three basic factual inquiries: the scope and content of the prior art, the differences between the prior art and the claims at issue, and the

level of ordinary skill in the art). “[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). Furthermore,

“there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness” . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

ANALYSIS

35 U.S.C. § 102(b) REJECTION

Appellants’ arguments in response to the Examiner’s anticipation rejection, based on Kwon, of independent claims 35 and 45 assert that the Examiner has not shown how each of the claimed features is present in the disclosure of Kwon so as to establish a *prima facie* case of anticipation. Appellants’ arguments (App. Br. 5-6; Reply Br. 1) focus on the contention that, in contrast to the requirements of appealed independent claims 35 and 45, the compliant layer 32 formed over the dielectric layer 34 in the semiconductor chip structure disclosed by Kwon (Fig. 2) does not have curved transition regions near the compliant layer’s top and bottom surfaces.

We agree with Appellants. In addressing the language of independent claims 35 and 45, the Examiner admits (Ans. 11) that Kwon does not explicitly teach that the sloping edges at the top and bottom surfaces of Kwon’s compliant layer 32 have curved transition regions but, nonetheless,

takes the position (Ans. 4, 8-10) that the existence of such curved transition regions would be inherent. We find no evidence in the disclosure of Kwon, or elsewhere in the record before us, to support such a conclusion. For example, Kwon's Figure 2 illustration of the compliant layer structure 32 indicates the complete absence of any curved transition regions near the top and bottom surfaces of the compliant layer 32. Similarly, we find no indication in Kwon's description (col. 4, l. 36-col. 5, l. 29) of the Figure 2 illustration, or the description of any of the other illustrated drawing figures, that would support a conclusion as to the existence of curved transition regions at top and bottom surfaces of compliant layer 32.

To establish inherency, evidence must make clear that the missing descriptive matter is *necessarily* present in the thing described in the reference and would be recognized as such by persons of ordinary skill. *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (citing *Cont'l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991)).

“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.” *Cont'l Can*, 948 F.2d at 1269 (quoting *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)).

In view of the above discussion, since all of the claim limitations are not present in the disclosure of Kwon, we do not sustain the Examiner's 35 U.S.C. § 102(b) rejection of independent claims 35 and 45, nor of claims 36-38, 40-42, 46-54, and 57 dependent thereon.

35 U.S.C. § 103(a) REJECTIONS

While we have not sustained the Examiner’s 35 U.S.C. § 102(b) rejection of claims 35-38, 40-42, 45-54, and 57 based on Kwon, we do sustain the Examiner’s alternative 35 U.S.C. § 103(a) rejection of these claims. In this alternative rejection, the Examiner has added the curved transition region teachings of Chen (Fig. 4B; col. 1, ll. 10-13; col. 3, ll. 52-64) to Kwon.

Appellants’ arguments in response do not attack the Examiner’s proposed combination of Kwon and Chen. Instead, Appellants direct attention (App. Br. 5-6; Reply Br. 1) to the language of independent claims 35 and 45 which requires the electroplating of “elongated bond ribbons” on top of the claimed dielectric layer and compliant layer. According to Appellants (App. Br. 5-6; Reply Br. 1), the metal contacts 28 of Kwon, identified by the Examiner (Ans. 4) as corresponding to the claimed “elongated bond ribbons,” are not “elongated bond ribbons” since they are actually conical in shape and are deposited to fill the via openings in compliant layer 32.

We do not find Appellants’ arguments to be persuasive of any error in the Examiner’s stated position, which finds (Ans. 8, 13) that the illustrated relative height and width dimensions of the V-shaped contacts of Kwon (Fig. 2) establish that such V-shaped contacts can be reasonably interpreted as corresponding to the claimed “elongated bond ribbons.” It is noteworthy that, while Appellants’ arguments (App. Br. 6; Reply Br. 1) attack Kwon’s disclosed V-shaped contacts 28 as being merely conductors which fill via openings in compliant layer 32, Appellants’ disclosed “ribbons” 170 also fill

a via opening, i.e., in passivation layer 130 as illustrated, for example, in Appellants' Figure 1F.

Even further, while Appellants contend (App. Br. 6; Reply Br. 1) that Kwon's V-shaped contacts 28 have a conical shaped cross-section and, therefore, cannot be considered to be "elongated bond ribbons" as claimed, we would point out that Appellants disclose an embodiment (Fig. 6B, Spec. 16:15-16) in which the conductors 175 fill and terminate in concave areas 310 formed in compliant layer 140" to create "cup-like" areas on the top surface 147" of the compliant layer 140". It is instructive that, despite the filling of the disclosed "cup-like" area of the compliant layer 140" by conductors 175, such terminal portions of conductors 175 are nonetheless described (Spec. 16:20) as "bond ribbon terminals."

We also sustain the Examiner's obviousness rejections of dependent claims 39, 43, 44, 55, and 56 in which the LeGrange and Palagonia references have been applied to the combination of Kwon and Chen to address, respectively, the encapsulant layer material and dicing operation features of the rejected claims. Appellants have made no separate arguments for the patentability of these claims but, rather, rely on those arguments presented with respect to the Examiner's obviousness rejection based on the combination of Kwon and Chen of independent claims 35 and 45, which arguments we found to be unpersuasive as discussed *supra*.

CONCLUSION

Based on the findings of facts and analysis above, we conclude that Appellants have shown that the Examiner erred in rejecting claims 35-38, 40-42, 45-54, and 57 for anticipation under 35 U.S.C. § 102(b). We also

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conclude, however, that Appellants have not shown that the Examiner erred in rejecting claims 35-57, all of the appealed claims, for obviousness under 35 U.S.C. § 103(a).

DECISION

Since we have sustained at least one of the Examiner's rejections of all of the appealed claims, the Examiner's decision rejecting claims 35-57 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

babc

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